REMARKS

Claims 1-90 are pending in the application. Claims 22-90 are withdrawn from consideration. In the present amendment, claims 1 and 11 have been amended to explicitly recite that the bipolar article has a configuration corresponding to the arbitrary form factor.

Each rejection in the Office Action of January 25, 2007 is addressed individually below.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 1-21 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite.

With respect to claim 1, the Office Action asserts that the "desired" arbitrary configuration is unclear. Without acquiescing in the propriety of the rejection, in order to expedite prosecution, Applicants have amended claim 1 herein to remove the term "desired."

With respect to claims 1, 7, 8, 11, 18 and 19, the Office Action asserts that the term "arbitrary" in "arbitrary form factor" and "arbitrary configuration" is unclear. Applicants respectfully submit that the terms "arbitrary form factor" and "arbitrary configuration" are defined in the specification, and thus are clear and definite as used in the claims. According to the specification, the "terms 'arbitrary form factor' and 'arbitrary configuration,' as used herein with respect to a bipolar article as a whole, refer to a bipolar article having an overall form that is not cylindrical or prismatic." (Page 3, lines 9-11).

Accordingly, Applicants respectfully submit that the claims satisfy the requirements under 35 U.S.C. §112, second paragraph, and withdrawal of the indefiniteness rejections is respectfully requested.

First Rejection under 35 U.S.C. §102(e)

Claims 1-21 were rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Chiang et al., US 2003/0099884, hereafter "Chiang." Applicants respectfully traverse this rejection.

Applicants' independent claims 1 and 11 are directed to bipolar articles having an arbitrary form factor. The article has a bipolar structure having an anode, a cathode, and an

electrolyte in contact with and separating the anode and cathode. The article includes a cathode current collector that is in electronic communication with the cathode, and an anode current collector that is in electronic communication with the anode. The bipolar article has a configuration that corresponds to the arbitrary form factor. According to the specification, the term "arbitrary form factor" is used with respect to a bipolar article as a whole, and refers to a bipolar article having ***an overall form that is not cylindrical or prismatic***. (Page 3, lines 9-11).

Chiang, which discloses battery structures including interpenetrating network structures (Abstract), does not anticipate claims 1-21 under § 102(e). Chiang's filing date is July 26, 2002, the same date as Applicants' priority date. Therefore, Chiang cannot serve as § 102(e) prior art with respect to Applicants' claims 1-21, unless Chiang's priority applications filed prior to July 26, 2002 properly support any subject matter that forms the basis of the rejection. (MPEP § 706.02(f)(1).) Chiang claims priority to provisional application 60/308,360, filed July 27, 2001, and is a continuation-in-part of U.S. Ser. No. 10/021,740, filed Oct. 22, 2001. However, these priority applications do not disclose a bipolar article wherein the ***article as a whole has an arbitrary form factor*** as claimed and defined in Applicants' specification.

Thus, Applicants respectfully submit that claims 1 and 11, and their dependent claims 2-10 and 12-21, are not anticipated by Chiang, and respectfully request that this rejection under § 102(e) be withdrawn.

Second Rejection under 35 U.S.C. §102(e)

Claims 1 and 11-12 were rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Shinn et al., US 2003/0114297, hereafter "Shinn." Applicants respectfully traverse this rejection.

Shinn teaches fuel cells including a "membrane electrode assembly that can increase the oxidation and reduction reaction area." (Paragraph 47). Shinn attempts to achieve increased reaction area, and thus improved power density, by forming a catalyst layer on the electrodes without reducing catalyst efficiency, and by including a plurality of protuberances in the shape of grooves. (Abstract, Paragraphs 48-49). To form Shinn's electrode structure, two supporting bodies are formed, each having a catalytic layer and a grooved structure on one side, and the

corresponding grooved structures are aligned and pressed together with a polymer electrolyte membrane in between. (Abstract).

Shinn does not anticipate Applicants' claims 1 or 11-12, because the reference does not disclose a bipolar article as claimed, wherein the ***bipolar article as a whole***, including anode, cathode, electrolyte and current collectors, has an ***arbitrary configuration*** (*i.e.*, not cylindrical or prismatic). While Shinn illustrates various grooved configurations for an electrolyte membrane interface between electrodes, this interface does not define the configuration for an overall device including electrodes and current collectors. Rather, the grooved interface is sandwiched between supporting members, which do not have an arbitrary configuration as claimed and defined in Applicants' specification. Shinn explains that the supporting bodies serve as the electrodes and current collectors. (*E.g.*, paragraphs 204-205). For example, Figure 2 of Shinn illustrates the disclosed grooved protuberance structure for the boundary within a membrane electrode assembly. However, the shape of the overall device in Figure 2, which is defined by electrode supporting bodies 220 and 225, is a regular rectangular block (*i.e.*, prismatic). Similarly, the Office Action refers to copper plates 190 and 195 in Figure 1 of Shinn, indicating that these are current collectors. However, the overall configuration of the device defined by plates 190 and 195 in Figure 1 again is a regular rectangular block (*i.e.*, prismatic). Thus, Shinn does not disclose an ***entire bipolar article*** that includes anode, cathode, electrolyte and current collectors and has an ***arbitrary form factor*** as claimed.

In view of the above, Applicants respectfully submit that claims 1 and 11-12 are not anticipated by Shinn, and respectfully request that this rejection under § 102(e) be withdrawn.

Provisional Double Patenting Rejection

Claims 1-21 were provisionally rejected for alleged nonstatutory double patenting over claims 1, 6-8, 12-16, 20, 23, and 29-30 of co-pending U.S. Application No. 2003/0099884 (Chiang).

Applicants note that Chiang's claims 1, 6-8, 12-16, 20, 23, and 29-30 have all been canceled, such that the present provisional double patenting rejection is moot and should be withdrawn. (See attached Exhibit A, claim set from Response filed Feb. 7, 2007 in the Chiang application, U.S. Ser. No. 10/206,662, available on public PAIR).

Furthermore, given that both the present application and the Chiang application are currently undergoing examination, such that the claims in both cases are in flux, Applicants respectfully request that the Examiner hold any such provisional double patenting rejections in abeyance pending a finding of allowable subject matter.

CONCLUSION

In view of the amendments and arguments set forth above, Applicants respectfully submit that the rejections contained in the Office Action mailed on January 25, 2007 have been overcome, and that the pending claims are in condition for allowance.

Applicants hereby petition for a three-month extension of time to respond to the Office Action of January 25, 2007. Please deduct the $510.00 fee for this purpose from our Deposit Account No. 08-0219. No other fees are believed to be due in connection with this correspondence. However, please charge any payments due or credit any overpayments to our Deposit Account No. 08-0219.

The Examiner is encouraged to telephone the undersigned at the number listed below in order to expedite the prosecution of this application.

Respectfully submitted,

Dated: 7/19/07

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Amendments To The Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claims 1-108. Canceled.

109. (Previously presented) An electrochemical device comprising:

a cathode and an anode separated from one another by a separator layer, said separator layer comprising an electrolyte,

wherein at least one of the anode and the cathode has a structure selected from the group consisting of sintered particles, fibers and an open cell foam or sponge,

wherein the separator layer has a thickness of less than or equal to 10 μm at at least one point,

wherein the ratio of the anode dimension perpendicular to the separator layer to an average separator thickness is greater than about 5:1, and

wherein the ratio of the cathode dimension perpendicular to the separator layer to an average separator thickness is greater than about 5:1.

110. (Currently amended) The device of claim 109 or 120, wherein the ratio of the anode dimension perpendicular to the separator layer to the average separator thickness is greater than about 10:1, and

wherein the ratio of the cathode dimension perpendicular to the separator layer to the average separator thickness is greater than about 10:1.

111. (Currently amended) The device of claim 109 or 120, wherein the ratio of the anode dimension perpendicular to the separator layer to the average separator thickness is greater than about 20:1, and

wherein the ratio of the cathode dimension perpendicular to the separator layer to the average separator thickness is greater than about 20:1.

112. (Currently amended) The device of claim 109, 110 [or] 111 or 120, wherein the separator layer has a thickness of about 0.5-5 μm at at least one point.

113. (Currently amended) The device of claim 109, 110, [or] 111 or 120, wherein the average thickness of the separator layer between the cathode and the electrode is less than about 50 μm.

114. (Currently amended) The device of claim 109, 110, [or] 111 or 120, wherein the average thickness of the separator layer between the cathode and the electrode is less than about 25 μm.

115. (Currently amended) The device of claim 109, 110, [or] 111 or 120, wherein the average thickness of the separator layer between the cathode and the electrode is less than about 10 μm.

116. (Currently amended) The device of claim 109, 110, [or] 111 or 120, wherein the electrolyte has an ionic conductivity of less than 10^{-4} S/cm.

117. (Currently amended) The device of claim 109, 110, [or] 111 or 120, wherein the anode and cathode of the device provide a mated surface that is at least 1.25 times the theoretical surface area of a smooth structure.

118. (Currently amended) The device of claim 109, 110, [or] 111 or 120, where the anode and cathode of the device provide an interpenetrating network.

119. (Previously presented) The device of claim 118, wherein the first and second electrodes are interlocking.

120. (Previously presented) The device of claim 109, wherein the sintered particles form a porous sintered body.

121. (Currently amended) The device of claim 109 or 120, wherein a cross-sectional lateral area of at least one of the cathode and the anode further from the separator layer is greater than a cross-sectional lateral area of the cathode or anode closer to the separator layer.

122. (Currently amended) The device of claim 109 or 120, wherein the device is an energy storage device.

123. (Currently amended) The device of claim 109 or 120, wherein at least one of the anode and the cathode comprises a lithium intercalating material.

124. (Previously presented) The device of claim 123, wherein the electrolyte is selected to facilitate diffusion of lithium ions between the first and second components.

125. (Previously presented) The device of claim 124, wherein the electrolyte is at least one of poly(ethylene oxide), poly(propylene oxide), poly(styrene), poly(imide), poly(amine), poly(acrylonitrile), poly(vinylidene fluoride), methoxyethyoxyethoxy phosphazine, diiodomethane, 1,3-diiodopropane, N,N-dimethylformamide, dimethylpropylene urea, ethylene carbonate, diethylene carbonate, dimethyl carbonate, propylene carbonate, a block copolymer lithium electrolyte doped with a lithium salt, glass with at least one of LiI, LiF,

LiCl, Li_2O-B_2O_3-Bi_2O_3, Li_2O-B_2O_3-P_2O_5 and Li_2O-B_2O_3-PbO and a sol or gel of the oxides or hydroxides of Si, B, P, Ti, Zr, Pb, or Bi.

126. (Previously presented) The device of claim 123, wherein at least one of the anode and the cathode comprises at least one of $LiCoO_2$ and, $LiCoO_2$ doped with Mg, $LiNiO_2$, or $LiMn_2O_4$, $LiMnO_2$, $LiMnO_2$ doped with Al, $LiFePO_4$, $LiFePO_4$ doped with one or more of Mg, Al, Ti, Nb, Ta, or W, $Li_2Fe_2(SO_4)_3$, V_2O_5, V_6O_{11}, C, amorphous carbon, graphite, mesocarbon microbeads, Li, LiAl, Li_9Al_4, Li_3Al, Zn, LiZn, Ag, LiAg, $Li_{10}Ag_3$, B, Li_5B_4, Li_7B_6, Ge, Si, $Li_{12}Si_7$, $Li_{21}Si_8$, $Li_{13}Si_4$, $Li_{21}Si_5$, Sn, Li_5Sn_2, $Li_{13}Sn_5$, Li_7Sn_2, $Li_{22}Sn_5$, Sb, Li_2Sb, Li_3Sb, Bi, LiBi, Li_3Bi, SnO_2, SnO, MnO, Mn_2O_3, MnO_2, Mn_3O_4, CoO, NiO, FeO, $LiFe_2O_4$, TiO_2, $LiTi_2O_4$, glass with a Sn-B-P-O compound and mesocarbon microbeads coated with at least one of poly(o-methoxyanaline), poly(3-octylthiophene), and poly(vinylidene fluoride).

127. (Withdrawn) An electrochemical device comprising:

a cathode and an anode separated from one another by a separator layer, the separator layer comprising an electrolyte,

wherein the separator layer has a thickness of less than or equal to one micron at at least one point and wherein the ratio of the anode dimension perpendicular to the separator layer to the average separator thickness is greater than about 20:1, and

wherein the ratio of the cathode dimension perpendicular to the separator layer to the average separator thickness is greater than about 20:1.

128. (Withdrawn) The device of claim 127, wherein the electrolyte has an ionic conductivity of less than 10^{-4} S/cm.

129. (Withdrawn) The device of claim 127, wherein the anode and cathode of the device provide a mated surface that is at least 1.25 times the theoretical surface area of a smooth structure.

130. (Withdrawn) The device of claim 127, where the anode and cathode of the device provide an interpenetrating network.

131. (Withdrawn) The device of claim 130, wherein the first and second electrodes are interlocking.

132. (Withdrawn) The device of claim 127, wherein the device is an energy storage device.

133. (Withdrawn) The device of claim 127, wherein at least one of the anode and the cathode comprises a lithium intercalating material.

134. (Withdrawn) The article of claim 127, wherein the electrolyte is selected to facilitate diffusion of lithium ions between the first and second components.